bending a prism of ice by fracture and regelation, does not prove that ice is non-viscous. This is perfectly true; nor is it conceived that the onus rests on us to prove the negative here. All that is claimed for the foregoing experiments is the referring of certain observed phenomena to a true cause, instead of to an imaginary one. An illustration may perhaps serve to place this question in its true light. By Newton's calculation, the velocity of sound through air was one-sixth less than what observation made it; and to account for this discrepancy he supposed that the sound passed instantaneously *through* the particles of air, time being required only to accomplish the passage from particle to particle. He supposed the diameter of each air-particle to be $\frac{173}{916}$ths of the distance between two particles, *and nobody ever proved him wrong*. Still, when Laplace assigned a *vera causa* for the discrepancy, the hypothesis of Newton, and other ingenious suppositions, were discarded. The proof indeed in such cases consists in the substitution of a *fact* for a *conjecture*; and whether this has been done in the case now before us, the intelligent reader must himself decide.

January 22, 1857.

Dr. W. A. MILLER, V.P., in the Chair.

The following communications were read:—

I. "On some of the Products of the Destructive Distillation of Boghead Coal."—Part I. By C. GREVILLE WILLIAMS, Esq., Assistant to Dr. ANDERSON, Professor of Chemistry in the University of Glasgow. Communicated by Dr. SHARPEY, Sec. R.S. Received November 25, 1856.

(Abstract.)

The paper, of which the following is a brief abstract, constitutes the first part of the author's examination of the hydrocarbons con-

tained in boghead naphtha. In it he gives the results of his experiments on that portion of the fluid which resists the action of monohydrated nitric and sulphuric acids. He had previously stated the fact of his having obtained a substance possessing the composition and vapour-density of butyl*, and had expressed a belief that he should succeed in isolating not only that radical, but also propyl, amyl, and caproyl. The composition of the radicals varies so little, that to determine the boiling-points it was necessary to take the density of the vapour of all those fractions which distilled anywhere near their known boiling-points; and in each case he regarded that fraction which gave the nearest result as representing the boiling-point of the radical as obtained from the source mentioned.

Propyl presented itself under the form of a colourless, very mobile fluid, having a pleasant odour, and boiling at 68° C. At 18° it had the very low density of 0·6745. Combustion gave results agreeing closely with the formula

$$C^{12}H^{14}=4 \text{ vols.},$$

confirmed by a determination of the density of its vapour by Gay-Lussac's method, which gave 2·96, theory requiring 2·97. Propyl had not been previously obtained.

Butyl from the Torbane-hill mineral distils at 119°, and has a density of 0·6945 at 18°; its analysis coincided with the formula

$$C^{16}H^{18}.$$

The vapour-density was found to be 3·88, theory requiring 3·94.

Amyl distilled at 159°, and had a density of 0·7365 at 18°. On analysis, numbers were obtained agreeing perfectly with the formula

$$C^{20}H^{22}.$$

The vapour-density was found to be 4·93; theory requires 4·91.

Caproyl boiled at 202°; its density at 18° was 0·7568. The results of analysis accorded with the expression

$$C^{24}H^{26},$$

which indicates a vapour-density of 5·87, while experiment yielded 5·83.

The experiments detailed in the paper appear to demonstrate the

* Proceedings of the Royal Society, vol. viii. p. 119.

radical nature of the hydrocarbons, and to negative the assumption of their being homologues of marsh-gas.

The paper concludes with a description of a method, by which, where numerous vapour-density determinations are to be made, the necessity is avoided of refilling the balloon with water or mercury in order to determine the residual air.

II. "On the Optical Characters of certain Alkaloids associated with Quinine, and of the Sulphates of their Iodo-compounds." By WILLIAM BIRD HERAPATH, M.D., in a Letter to Professor STOKES, Sec. R.S. Communicated by Professor STOKES. Received January 8, 1857.

You will probably recollect that I sent you some time since a small portion of an alkaloid, which at that time was called quinidin in Germany, but it has since been distinguished from it and named cinchonidin. You then examined it for epipolism or fluorescence, and you pronounced the opinion that it possessed this property only in a minor degree, and you imagined that this arose from the presence of a small per-centage of α-quinine.

I have since obtained, through the kindness of Mr. J. E. Howard, specimens of the perfectly pure alkaloids quinidin and cinchonidin, and find that quinidin, which I can now identify as the β-quinine of Von Heijningen, possesses the phenomenon of fluorescence or epipolic dispersion as powerfully as α-quinine; whilst cinchonidin, if perfectly pure, is devoid of it altogether; and recent experiments have shown me that a small per-centage of quinidin was the cause of the epipolic dispersion found by you in the specimen of cinchonidin sent by me.

It may be as well to state that the cinchonidin tested by water of chlorine and ammonia gave no evidence of green tint, which it would have done if only $\frac{1}{5000}$dth part of either α-quinine or quinidin had been present, according to some recent experiments of my own.

I have also found that 1 gr. of pure quinine or quinidin in 35,000 of water will give an evident "*epipolic*" appearance; whilst when diluted with 70,000 grs. of water we have still very evident appear-